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(54) Tensioning device

(57) The invention relates to a tensioning device particularly suitable for use in securing wire ropes or hawsers, for example in the building construction industry. The device is suitable for securing ropes (26) to stanchions or steel joists (2) so that tension is maintained in the rope length. The device comprises a main body portion (10) having two parallel passageways (12, 14) the first of which receives a threaded rod (4) in a sliding fit one end of the rod being anchored to the substrate (2) by means including a lock nut (6), the rope end being secured in the second passageway (14) by fastening means (18, 20). The rope (26) may then be tensioned by turning a lock nut (8) on the rod (4) to force the body portion (10) towards the substrate.

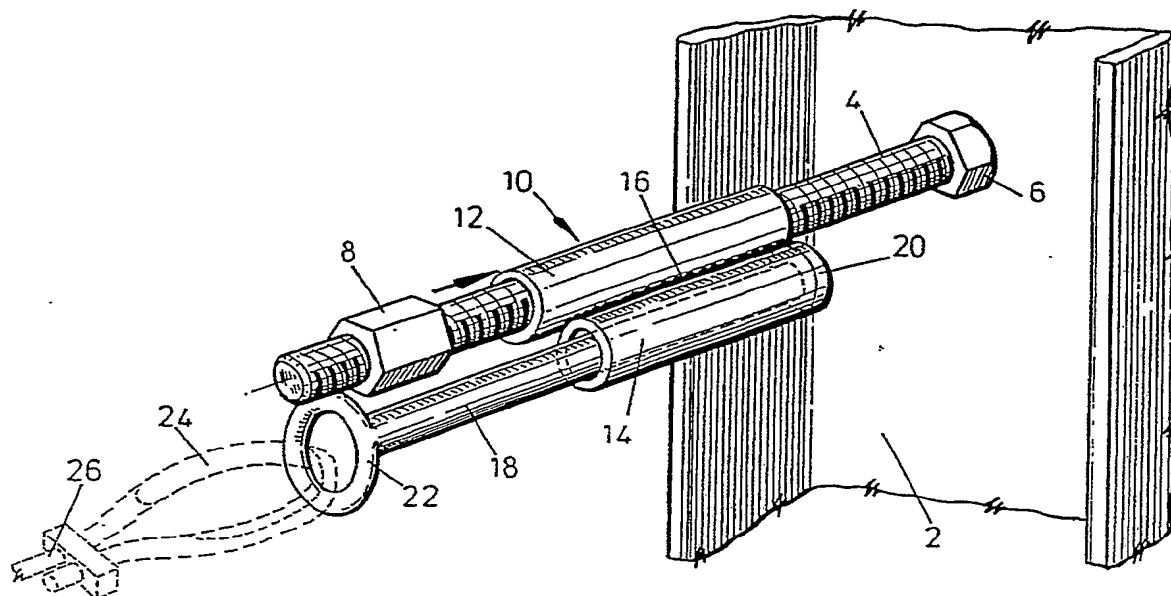


FIG. 1

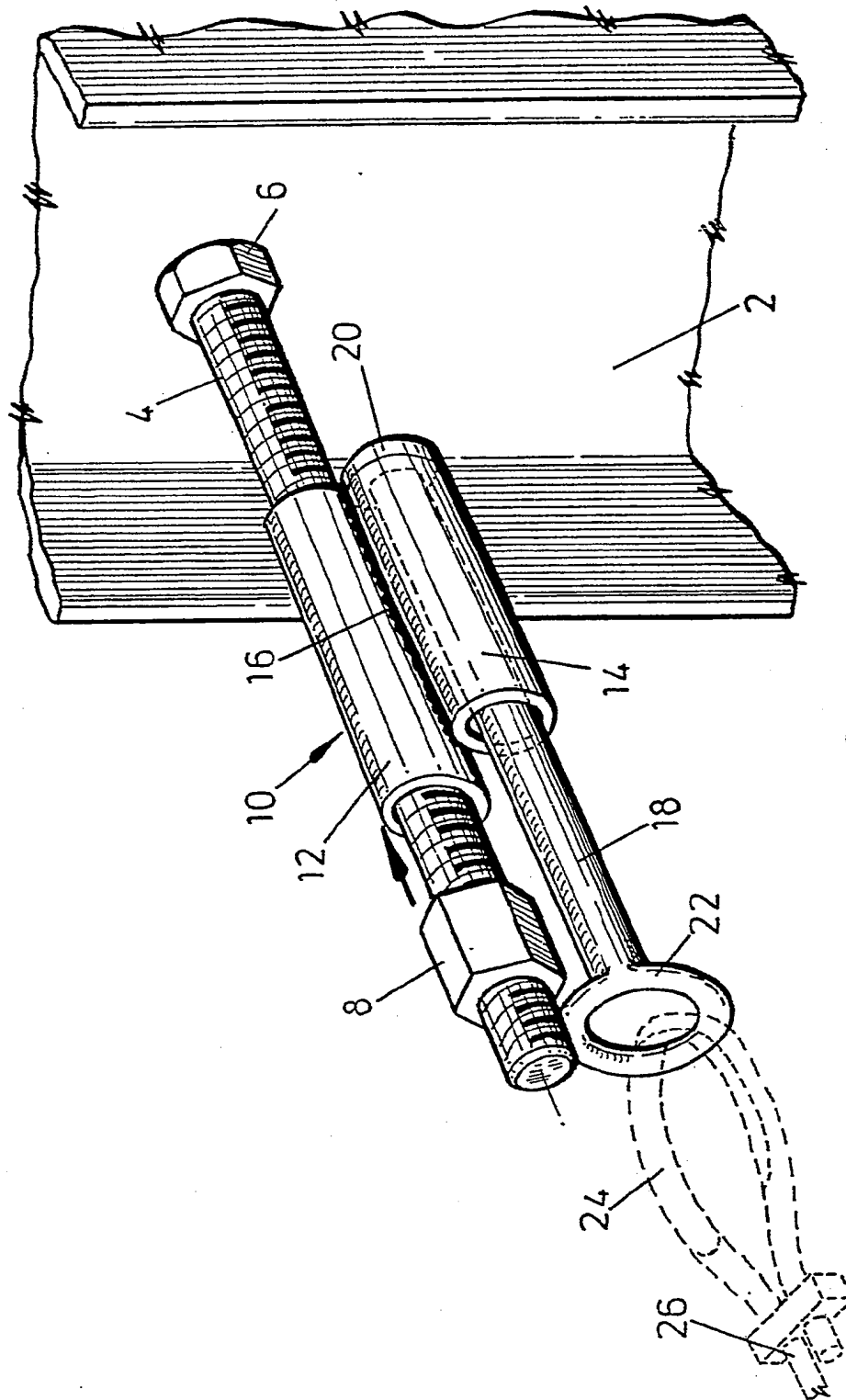
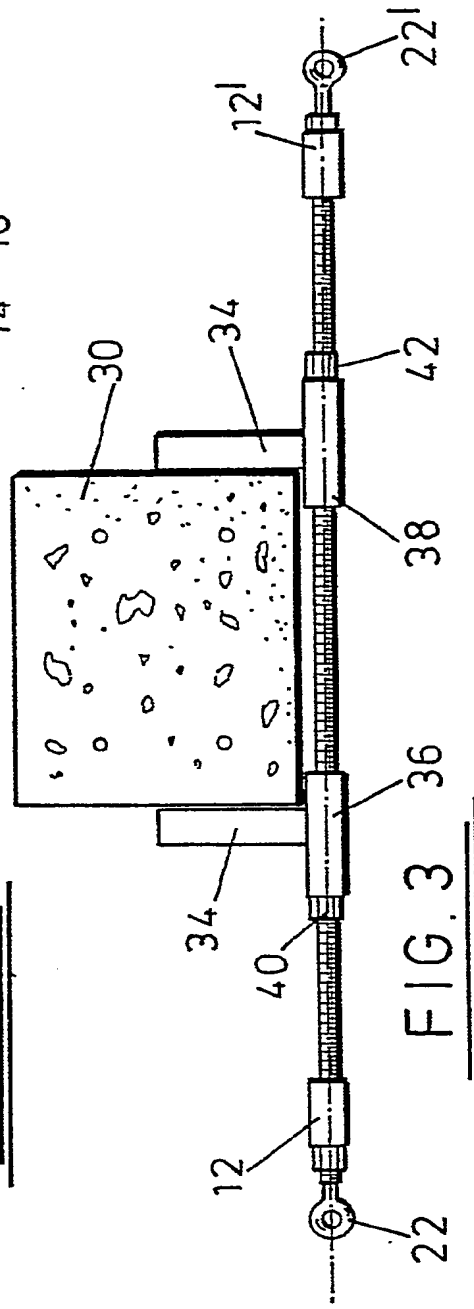
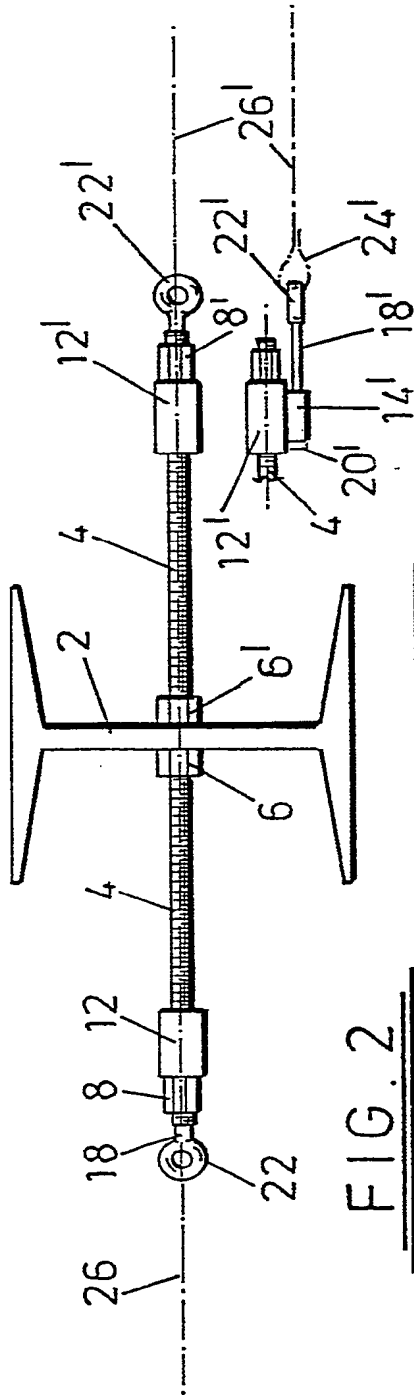


FIG. 1



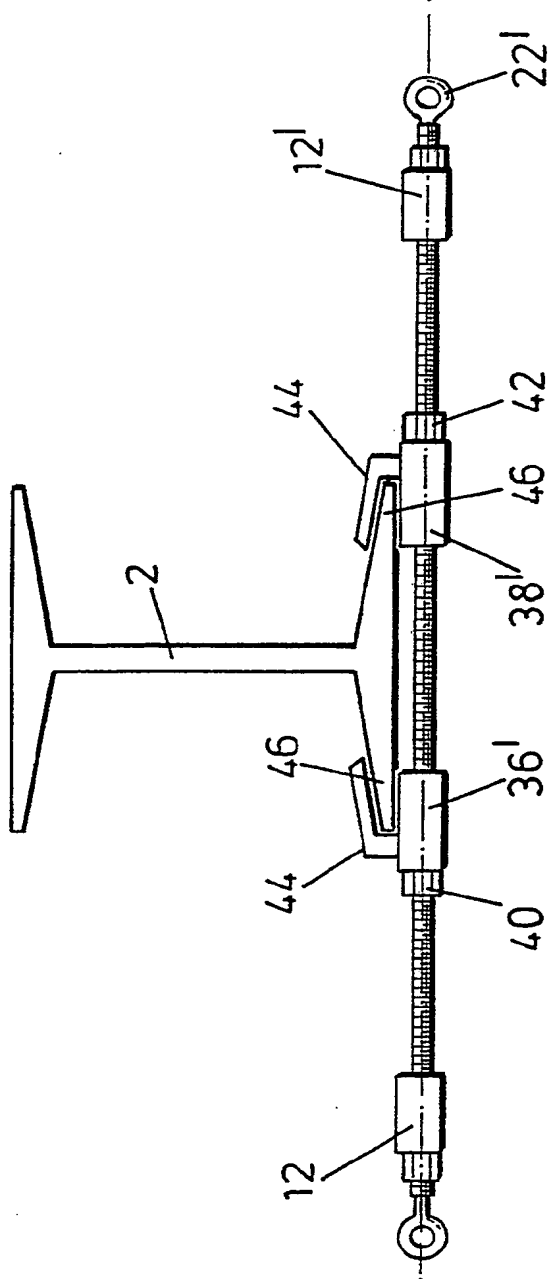


FIG. 4

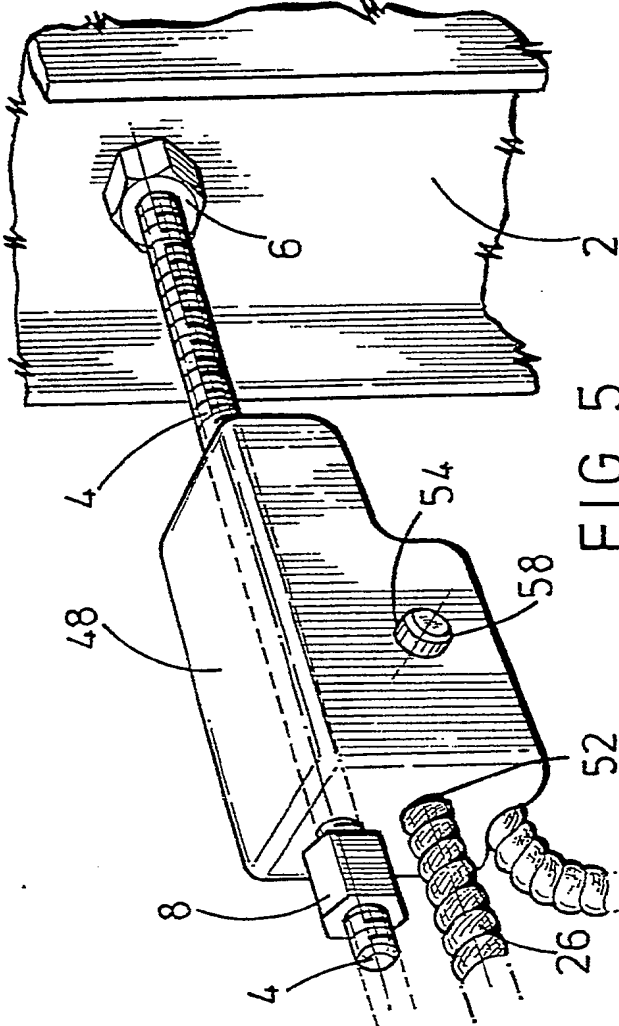


FIG. 5

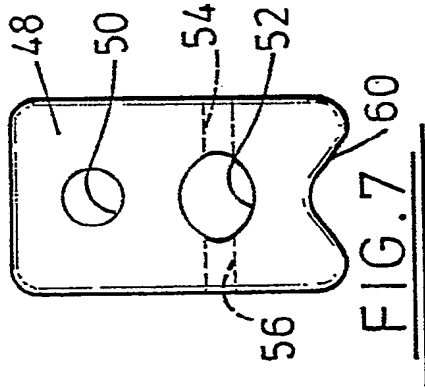


FIG. 7

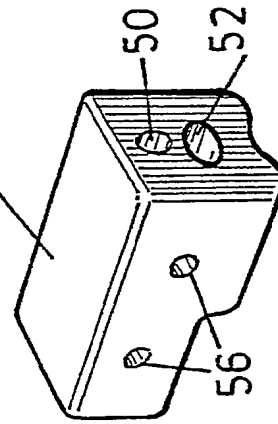


FIG. 6

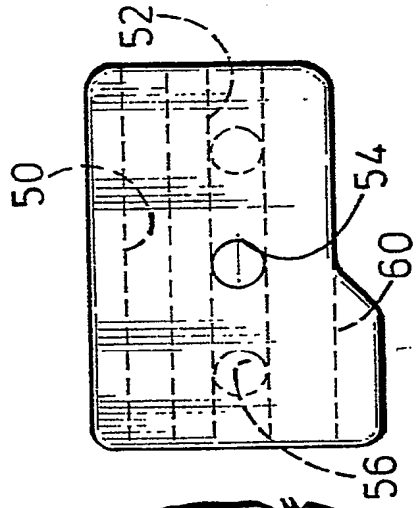


FIG. 8

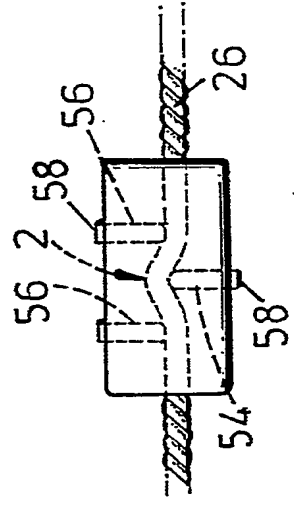


FIG. 9

TENSIONING DEVICE

The invention is concerned with improvements in or relating to tensioning devices for elongate members, particularly but not exclusively, elongate hawsers, cables or other flexible connecting members.

In the construction industry, a building may be erected using a skeleton structure of fabricated steel components with reinforced concrete floor structures and pre-formed wall panels. The advantage of such techniques is that comparatively tall buildings may be erected without the use of scaffolding, the building being supported by its own skeleton structure as it is formed. However, the absence of scaffolding requires other precautions to be taken to enhance the safety of those working on the building. Therefore additional protection has to be provided at the edges of floors and decks to minimise the risks of personnel falling from considerable heights.

Conventionally, this has been afforded by the provision of a barrier comprising two wire ropes extending between columns or stanchions of the building. Such ropes, which may be 10mm steel cables or hawsers, are secured to end or corner stanchions and a run of rope may pass through apertures in a number of intermediate stanchions. This system has the advantages of speed and relative simplicity but also has serious disadvantages. These stem mainly from the practical requirement of

keeping the rope under sufficient tension to be effective as a safety device. Effective tensioning obviously cannot take place until the steel stanchions are secured in the correct, vertical, orientation, which means that for unacceptably long periods of time the ropes may be ineffective while the stanchions are "plumbed". Even after this stage, the wires required continued monitoring and maintenance to ensure adequate tensioning even after the movement of heavy materials, for example the pumping of concrete, over the wires.

In order to meet reasonable standards of safety, the deflection of a length of wire rope from its normal line position between two stanchions should be no more than, say, 100mm under test conditions in which an impact force of 1.25KN is applied to one rope only of the barrier.

It will be understood that wire ropes are not suited to being wrapped around stanchions, since small radius edges of the latter could bring about severing of the rope, and slipping heightwise on the stanchion may occur.

It is extremely difficult to ensure that the required tension is always present by tightening existing means of securing the ropes to the columns or stanchions, since the weight and position of the cable makes the operation of conventional screw jacks turnbuckles, bottle screws etc., under many circumstances almost impossible.

The invention therefore has for one of its objects the provision of a tensioning device for elongate members such

as the ropes described above, which enables the members readily to be tensioned and re-tensioned in adverse conditions of use.

The invention provides a tensioning device for an elongate member, said device comprising a main body portion provided with two at least substantially parallel passageways, a first of said passageways being provided with a rod member extending therethrough in a sliding fit, means for anchoring said rod member at one end thereof to a support substrate, means engageable with an opposite end of the rod portion at selected positions therealong to limit the effective length of the rod portion passing through said first passageway to the substrate, there being mounted within said second passageway fastening means adapted to retain an end portion of said elongate member, the latter thus being enabled to extend therefrom under tension in a direction away from the anchoring means.

Advantageously, said rod member is threaded along at least end portions of its length, the threaded portion(s) comprising a fast thread.

Conveniently, said anchoring means may co-operate with an anchoring means of a further tensioning device positioned at a second position on said support substrate.

In examples of devices according to the invention the fastening means may be clamping means or may be a captive member freely rotatable in said second passageway to avoid twisting of the elongate member in use. In the latter

case, the freely rotatable member may advantageously include a ring head portion to receive a looped end portion of the elongate member which may be a cable or hawser.

In examples of pairs of devices according to the invention when used with support substrates comprising metal stanchions or the like, a single threaded rod may be secured in an aperture in the stanchion so as to form two rod portions, each adapted to form part of one of said devices. Alternatively, where the stanchion is a rolled steel joist (RSJ) having an H-shaped cross-section, clip means may be used to fasten the thread rod to side portions of the RSJ.

In examples of pairs of devices according to the invention when used with reinforced concrete columns, a single threaded rod may be secured across a side wall of said column by clamping means, so as to form two rod portions, each adapted to form part of one said devices.

Advantageously, said rod or rod portions are provided with a thread having a relatively steep angle of inclination relative to the rod axis, that is, a so-called fast thread.

There will now be described an example of a device according to the invention. It will be understood that the description, which is intended to be read with reference to the drawings, is given by way of example only and not by way of limitation.

In the drawings:-

Figure 1 is a perspective view of a device according to the invention secured to a steel stanchion;

Figure 2 is a top plan view of the device of Figure 1;

Figure 3 is a modification of the device for use secured to a re-inforced concrete column;

Figure 4 is a further modification of the device of Figures 1 and 2, incorporating a clip device;

Figure 5 is a perspective view of a further example of a device according to the invention; and

Figures 6 to 9 are, respectively, perspective, end, side and top views of the device shown in Figure 5.

Figure 1 shows a portion of a steel stanchion 2 to which is secured a rod 4 by means of a lock nut 6 mounted on a threaded end portion thereof. A second lock nut 8 is mounted on the rod 4 at its opposite end portion and, mounted on the length of rod between the two lock-nuts 6 and 8, is a main body portion of the device indicated at 10. The body portion 10 comprises in the present example two sleeve members 12, 14 welded together lengthwise at 16 so as to provide two parallel passageways. The rod 4 the threaded portion of which are of the kind known as a fast thread passes freely through the passageway of sleeve member 12.

Received in the passageway of the sleeve member 14 is a retaining member 18, which is arranged for free rotation within the sleeve member but is held captive against

lengthwise withdrawal from the sleeve member 14 by an end plate 20 at one end thereof. At the opposite end, the left-hand end as viewed in Figure 1, there is provided a ring head member 22, through which is received a reinforced loop 24 of a wire rope 26.

In use, the rope 26 may be tensioned initially, and at any later point in time at which it becomes necessary, by turning the lock nut 8 so that it commences to run along the fast thread rod 4. As can be seen in Figure 2, as it abuts the left-hand end surface of the sleeve 12, continued turning of the nut 8 forces the sleeves 12 and 14 to the right. Because the member 18 is captive in the passageway of the sleeve 14, the steel rope 26 becomes progressively more taut until the desired tension level is achieved. Any tendency for the rope 26 to rotate is accommodated by the rotation permitted to the member 18 in the sleeve 14.

Figure 2 is a plan view showing two ropes 26 and 26' in position, extending from one stanchion 2 and mounted on a through rod 4 by means of two lock-nuts 6 and 6'. A scrap view is also included to show a side elevation of the right-hand device.

Figure 3 shows a similar device having a through rod 28, each end of which comprises a device similar to those shown in Figure 2. The devices are mounted on a reinforced concrete column 30 by means of a pair of clamping arms 32, 34 slidably mounted in sleeves 36, 38

onto the rod 28 and held firmly against the column by means of lock nuts 40 and 42.

Figure 4 shows a further modification to suit an H-shaped cross-section stanchion which is not drilled to receive a through rod. Two clip members 44 are therefore provided on the sleeves 36', 38' to engage edges of the stanchion web portions 46.

Figure 5 is a view similar to that of Figure 1 illustrating a further example of a device according to the invention. Similar reference numerals are used where appropriate. The Figure shows a portion of steel stanchion 2 to which is secured a fast thread rod 4 by means of a lock nut 6. A second lock nut 8 is mounted on the rod 4 at its opposite end and on the length of rod between the two lock nuts 6 and 8, is a device comprising a block 48 through which pass two parallel passageways 50 and 52. The rod 4 passes freely through passageway 50.

The passageway 52 receives a wire rope 26 in a manner which will be described below. The passage 52 is oval in cross-section and a bore 54 is provided in one wall of the block and two bores 56 in the opposite wall, to provide communication with the passageway 52 to receive securing screws 58.

Figure 6 shows the opposite perspective view of the block 48 in which is formed a recess 60 in which the free end of the cable 26 may be received. The cable itself is secured in the passageway 52 by means of the screws 58

which clamp the cable 26 within the over-sized wider diameter so as to deform the cable into a S-configuration at 62.

It will be understood that two devices such as are illustrated in the example described with reference to Figures 5 to 8 may be used instead of the devices shown in Figures 2 to 4, and operate in the same manner.

It is to be noted that the arrangements described above may be found satisfactory not only to maintain safety rope barriers at the required tension, but also, with heavy-duty specifications, to use the tensioned ropes to support safety harnesses for construction personnel. Further advantages may be found to accrue from the use of the invention. It will be apparent that the rope may be used in relatively short lengths, which improve handling facility on site, and also permit re-use of lengths of rope. Hitherto, it has been customary to scrap most steel ropes after use. Lengths of rope may also be temporarily removed, if required, perhaps to allow access for heavy materials or machinery supplied by crane or helicopter to the desired level.

Various modifications may be made within the scope of the invention as defined in the following claims.

CLAIMS:

1. A tensioning device for an elongate member, said device comprising a main body portion provided with two at least substantially parallel passageways, a first of said passageways being provided with a rod member extending therethrough in a sliding fit, means for anchoring said rod member at one end thereof to a support substrate, means engageable with an opposite end of the rod portion at selected positions therealong to limit the effective length of the rod portion passing through said first passageway to the substrate, there being mounted within said second passageway fastening means adapted to retain an end portion of said elongate member, the latter thus being enabled to extend therefrom under tension in a direction away from the anchoring means.
2. A device as claimed in claim 1, wherein said rod member is threaded along at least end portions of its length.
3. A device as claimed in claim 2, wherein at least one of the threaded end portions of the rod member comprises a fast thread.
4. A device as claimed in any one of the preceding claims, wherein the fastening means is a clamping means.
5. A device as claimed in claim 4, wherein the main body member comprises a block having said two passageways bored therethrough, said second passageway being provided with said clamping means in the form of screw clamps.

6. A device as claimed in any one of claims 1 to 3, wherein the fastening means is a captive fastening member freely rotatable in said second passageway.

7. A device as claimed in claim 6, wherein the main body member comprises two tubular sleeve members secured together in side-by-side relationship so as to provide said two passageways.

8. A device as claimed in any one of the preceding claims, wherein the anchoring means may co-operate with an anchoring means of a further tensioning device positioned at a second position on said substrate.

9. A device as claimed in claim 8, wherein a single rod member may be provided upon which are mounted for co-operation the main body portions and associated anchoring means of the two devices.

10. A device as claimed in claim 9, wherein said anchoring means comprise lock nuts.

11. A device as claimed in claim 10, wherein said anchoring means further comprise clamping arms.

12. A tensioning device for an elongate member, constructed and arranged substantially as hereinbefore described with reference to and as shown in

(a) Figures 1 to 4

(b) Figures 5 to 9 of the drawings.

Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)

Application number

9211118.6

Relevant Technical fields

(i) UK CI (Edition K) F2G GG

(ii) Int CI (Edition 5) F16G 11/12

Databases (see over)

(i) UK Patent Office

(ii)

Search Examiner

R J DOWNING

Date of Search

20 JULY 1992

Documents considered relevant following a search in respect of claims

1-12

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 944238 (VIDALI) - the whole document	1,2

Category	Identity of document and relevant passages	Relevant to claim(s)

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